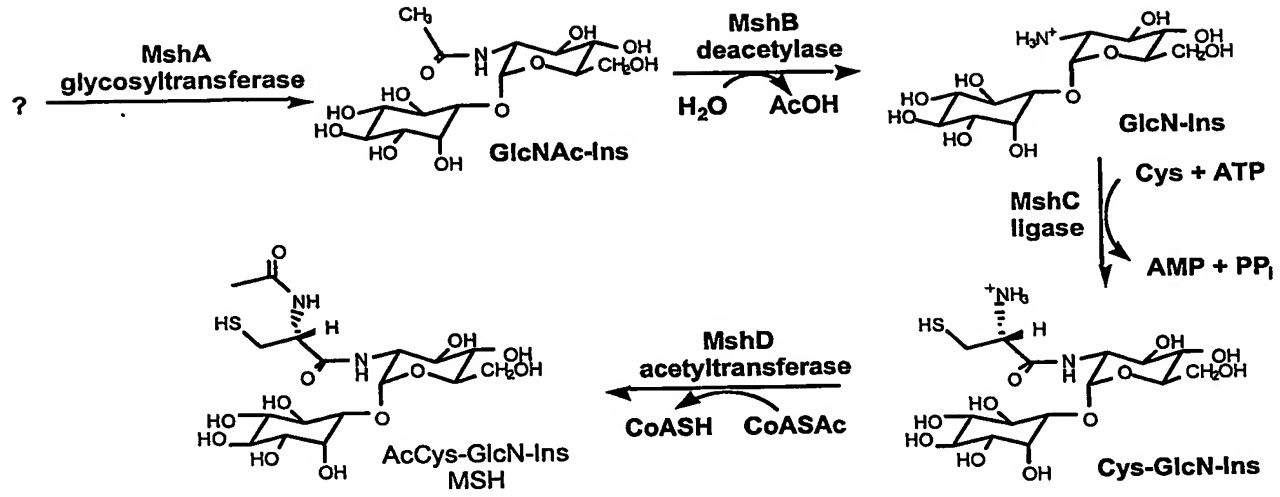



**Figure 1**

MshC nucleic acid sequence of *M. smegmatis*

ATGCAATCGTGGTCGGCACCGGCGATTCCGGTGGTTCCGGGACGTGGCCCTGCGCTG
CGCCTCTTCGACAGCGCTGATCGCCAGGTCCGGCCCGTCACACCGGGACCGACCGC
AACCATGTACGTGTGCGGCATCACCCCATACGACGCGACCCATCTGGGTCACGCCGC
GACCTATCTGACGTTCGACCTGGTGCATCGCCTATGGCTCGACGCCGGACACACCGT
GCAGTACGTCCAGAACGTCACCGACGTGGACGACCCGTTGTTCGAGCGTGCTGAGC
GCGACGGCATCGACTGGCGGACGCTGGGCGACCGCGAGACGCAGCTGTTCCGTGAG
GACATGGCCGCGTTGCGCGTGCTGCCCCCGCACGACTACGTCGCCGCGACCGACGC
GATCGCCGAGGTCGTCGAGATGGTCGAGAAGCTGCTGGCCTCGGGTGCGGCGTACA
TCGTCGAGGACGCCGAGTACCCCGACGTGTACTTCCGCGCCGACGCCACCGCGCAG
TTCGGGTACGAGTCCGGCTACGACCGCGACACCATGCTCACGTTGTTCGCCGAACGC
GGCGGGGACCCGGACCGCCCGGGCAAGTCCGATCAACTCGACGCGTTGCTGTGGCG
CGCCGAGCGTCCTGGCGAGCCCAGCTGGCCTTCGCCGTTCGGCCGGGGCCGGCCCG
GCTGGCACGTGGAATGTTCGGCGATCGCCCTGACGCGGATCGGCACCGGCCTCGAC
ATCCAGGGCGGCGGCAGCGACCTCATCTTCCCGCACCACGAGTATTCGGCCGCGCA
CGCCGAATCCGTCACCGGTGAGCGACGATTCGCACGCCACTACGTGCACACCGGCA
TGATCGGCTGGGACGGCCACAAGATGAGCAAGAGCCGCGGCAACCTGGTCCTGGTG
TCGCAGTTGCGCGCCCAGGGCGTCGACCCGTCGGCGATCCGGCTCGGCCTGTTCTCC
GGGCACTACCGCGAGGACCGGTTCTGGAGCAACGAGGTTCTCGACGAGGCCAACGC
GCGACTCGCGCGGTGGCGCAGTGCCACCGCATTGCCCGAGGCGCCCGATGCGACCG
ACGTGATCGCGCGCGTCCGGCAGTACCTGGCCGATGACCTGGACACGCCGAAAGCG
CTTGCCGCACTCGATGGTTGGTGTACCGACGCGCTGTCCTACGGTGGGCACGACACC
GAGTCGCCGCGGCTCGTGGCCACCACCGTCGACGCGTTGCTGGGTGTGGACCTC

**Figure 2A**

MshC amino acid sequence of *M. smegmatis* (PMshCMs)

MQSWSAPAIP VVPGRGPALR LFDSADRQVR PVTPGPTATM
YVCGITPYDA THLGHAATYL TFDLVHRLWL DAGHTVQYVQ
NVTDVDDPLF ERAERDGIDW RTLGDRETQL FREDMAALRV
LPPHDYVAAT DAIAEVVEMV EKLLASGAAY IVEDAEYPDV
YFRADATAQF GYESGYDRDT MLTLFAERGG DPDRPGKSDQ
LDALLWRAER PGEPSWPSPF GRGRPGWHVE CSAIALTRIG TGLDIQGGGS
DLIFPHHEYS AAHAESVTGE RRFARHYVHT GMIGWDGHKM
SKSRGNLVLV SQLRAQGVDP SAIRLGLFSG HYREDRFWSN
EVLDEANARL ARWRSATALP EAPDATDVIA RVRQYLADDL
DTPKALAALD GWCTDALSYG GHDTESPRLV ATTVDALLGV DL (SEQ ID
NO: 2)

**Figure 2B**

>cysS2: 1242 bp - M. tuberculosis -

atgcagtcgtggtattgcccaccggttccggtgttgccgggacgaggcccgcagctacgg
ctgtacgacagcgccgaccggcaggtccgtccggtggcgcccggatctaaggccaccatg
tacgtctgcgggatcacgccctacgacgccacgcatctgggccatgctgccacctatgtg
acgttcgacctgatccatcggctgtggctggatctcggtcatgaattgcactatgtccag
aacatcaccgacatcgacgatccactatttgagcgcgcggatcgcgacggtgtcgactgg
cgtgaccttgcccaagccgaggtcgccctgttctgtgaggacatggcggcgctgcgggtg
ctaccaccgcaagactacgtgggggccaccgaagcgattgctgaaatggtcgagctcatc
gaaaaaatgctggcgtgcggggcggcctatgtcatagaccgggaaatgggagagtaccag
gacatctacttccgcgctgacgccaccctgcagttcggctacgagtcagggtatgaccgt
gacaccatgctgcggctgtgcgaggaacgtggcggcgatccgcggcgccccggcaagagc
gacgaactcgacgcgttgttgtggcgggccgcgcggcccggtgagcccagctggccgtcc
ccgttcgggcctggccggccaggctggcatgtcgagtgcgcagccatcgcgctcagtcgt
atcggaagcggcctcgacatccagggcggtggtagcgatctgatctttccgcaccacgag
ttcaccgctgcgcacgccgaatgtgtcagcggcgaacggcgattcgcgcggcactacgtg
catgccgggatgatcggctgggacgggcacaagatgtcaaagagccgcggcaacctcgtg
ctggtgtcggcgctgcgtgcgcaggacgttgagccatcggcggttcggctgggtttgctc
gccggacactaccgagccgatcggttctggagccagcaggtgcttgacgaggcgaccgcc
cggctgcaccgttggcgcaccgcaaccgcacttcccgccggtccggccgcagttgacgtt
gtcgctcgggtgcgccgctacctggccgacgatctcgatacgcccaaagcgattgccgca
ctggatggttgggtcaccgatgcggtggagtacggcggccacgatgccggggcgccgaag
ttggtggcgacggcgatcgatgccctgctcggggtggacctg

**Figure 2C**

MshC amino acid sequence of *M. tuberculosis* (PMshCMtP1101)

MQSWYCPPVPVLPGRGPQLRLYDSADRQVRPVAPGSKATMYVCGITPYD
ATHLGHAATYVTFDLIHRLWLDLGHELHYVQNITDIDDPLFERADRDGVD
WRDLAQAEVALFCEDMAALRVLPPQDYVGATEAIAEMVELIEKMLACGA
AYVIDREMGEYQDIYFRADATLQFGYESGYDRDTMLRLCEERGGDPRRPG
KSDELDALLWRAARPGEPSWPSPFGPGRPGWHVECAAIALSRIGSGLDIQG
GGSDLIFPHHEFTAAHAECVSGERRFARHYVHAGMIGWDGHKMSKSRGN
LVLVSALRAQDVEPSAVRLGLLAGHYRADRFWSQQVLDEATARLHRWRT
ATALPAGPAAVDVVARVRRYLADDLDTPKAIAALDGWVTDAVEYGGHD
AGAPKLVATAIDALLGVDL (SEQ ID NO: 4)

**Figure 2D**

MshC amino acid sequence of *Corynebacterium striatum* (AAG03366) (PMshC-Cor.s-GB)

MHAWPDPSVPAVAGTPVPLKLFDTADQRVKEVDTTPDANGEVGMYVCGI
TPYDSTHLGHAATYLTFDLAQRQLLANGHKVHYVQNITDVDDPLFERAER
DGVDWRELGTSQINLFRSDMEILSVIPPCDYIGAMESVDEVIAMVQQLLDA
GAAYELDQGDIYASIDATEQFGYESNLDRATMEEYFAERGGDPDREGKRD
PLDALVWRGHREGEPAWDSPFGPGRPGWHVECSAIATNRLGSHFAIQGGG
SDLAFPHHEFSAAHAEAALKVERMAGHYVHAGMIALDGVKMSKSLGNL
VFVHKLSEAGHDPSAIRLAVFAGHYREDRDFSDAILAEAEERLTRWREQL
AGEVSEAEATEVVDKLRAILADDLNTPEALSLLDGAAGDCNQIIATALDGL
LGVRI (SEQ ID NO: 5)

**Figure 2E**

MshC amino acid sequence of *Streptomyces coelicolor* A3(2) (CAC36366) (PMshCScGB1101)

MHAWPASEVPALPGQGRDLRIHDTATGGPVTLDPGPVARIYVCGITPYD
ATHMGHAATYNAFDLVQRVWLDTKRQVHYVQNVTDVDDPLLERAVR
DGVDWTALAEQETALFREDMTALRMLPPQHYIGAVEAIPGIVPLVERLR
DAGAAYELEGDVYFSVEADPHFGGVSHLDAATMRLLSAERGGDPDRP
GKKNPLDPMLWMAAREGEPSWDGGTLGRGRPGWHIECVAIALDHLGM
GFDVQGGGSDLAFPHHEMGASHAQALTGEFPMAKAYVHAGMVGLDG
EKMSKSKGNLVFVSQLRREGVDPAAIRLTLLAHHYRSDWEWTDQVLQ
DALARLDRWRAAVSRPDGPPAEALVEEIREALANDLDSPAALAAVDRW
AALQQESGGTDIGAPGVVSRAVDALLGVAL (SEQ ID NO: 6)

**Figure 2F**

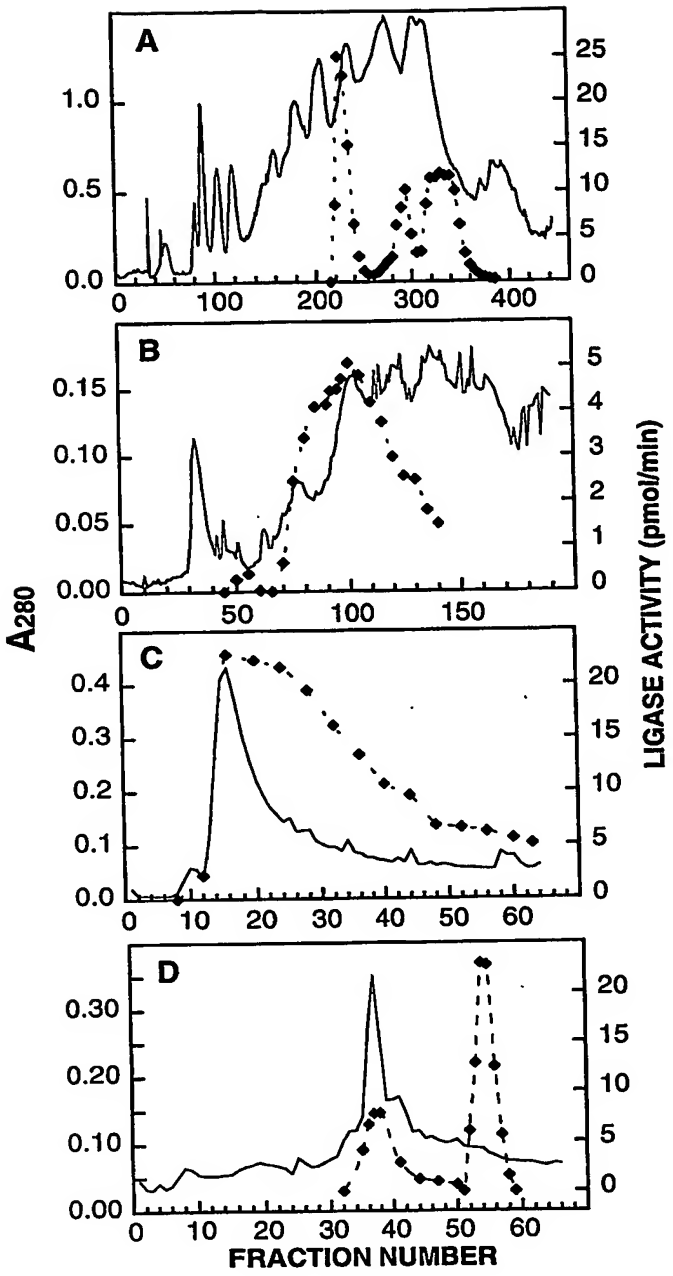



Figure 3

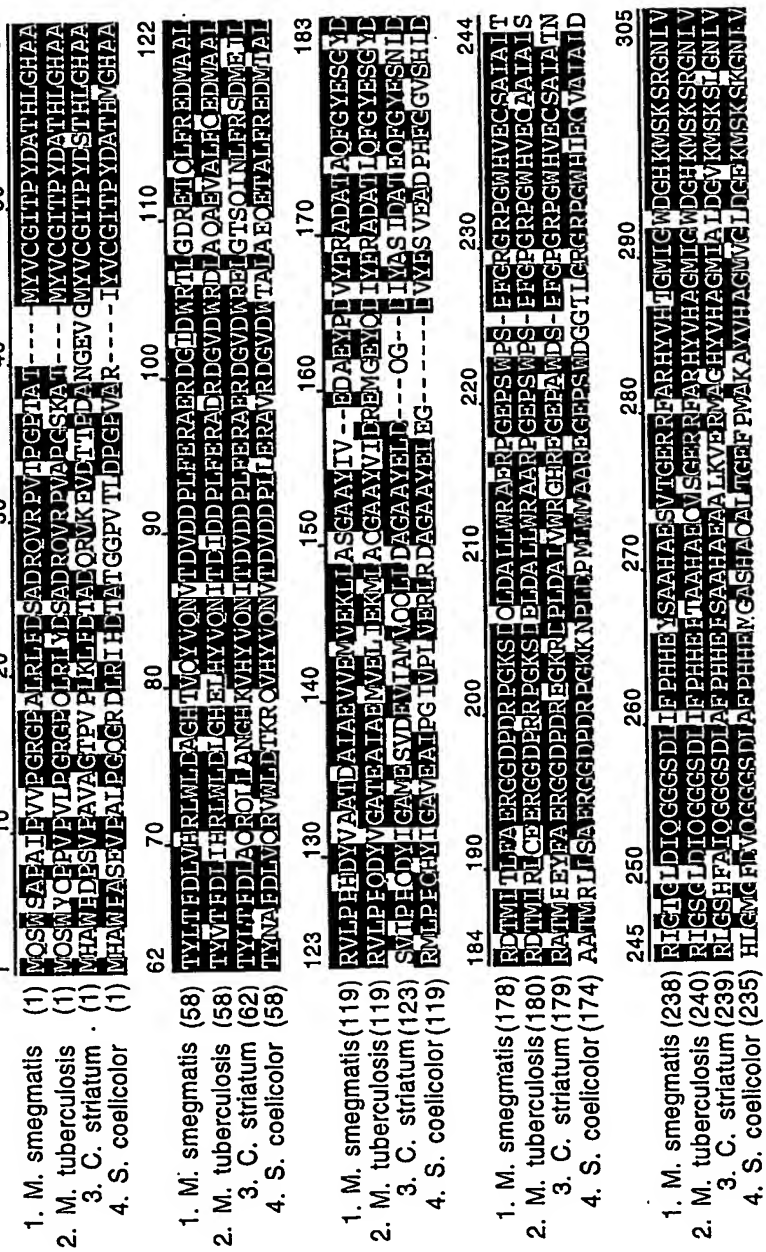


Figure 4

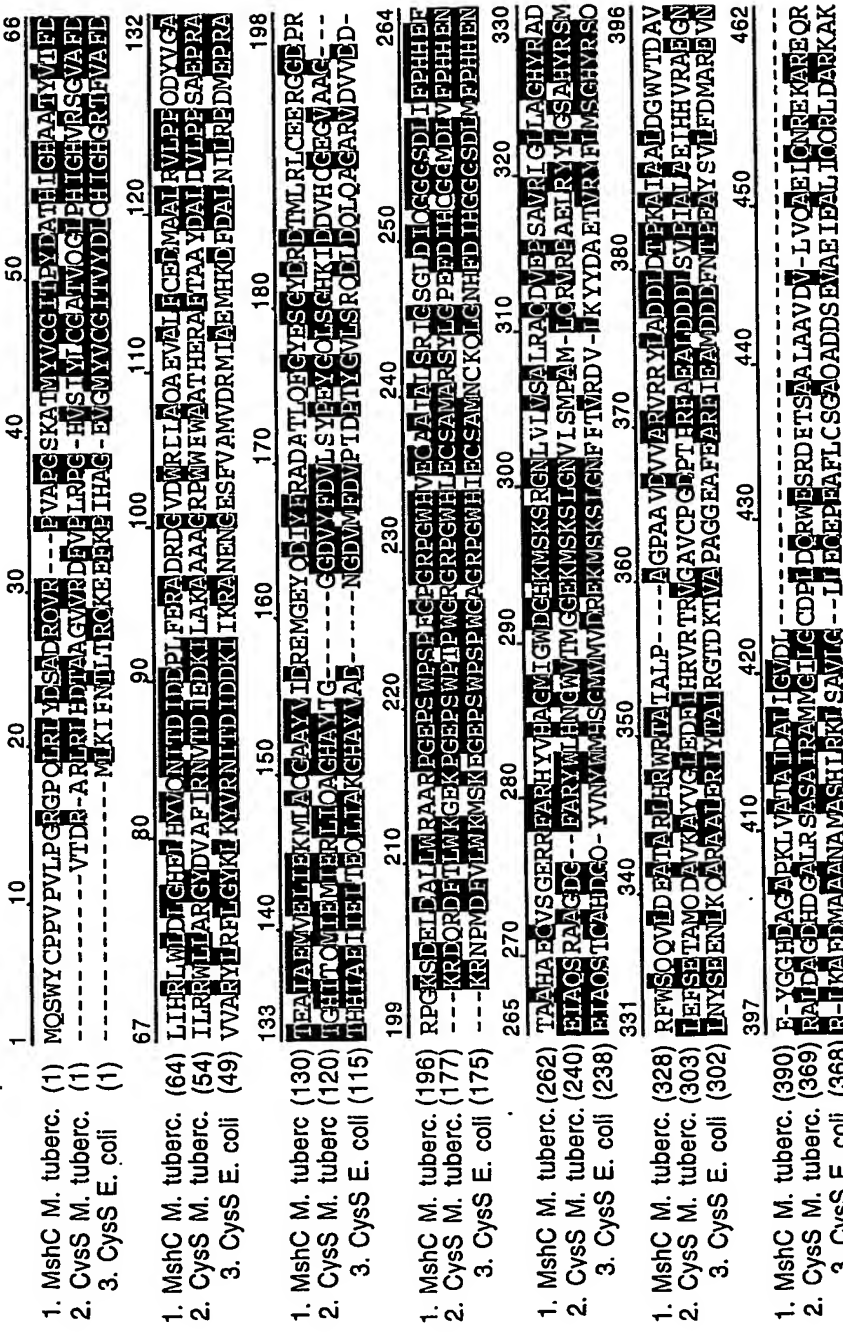


Figure 5

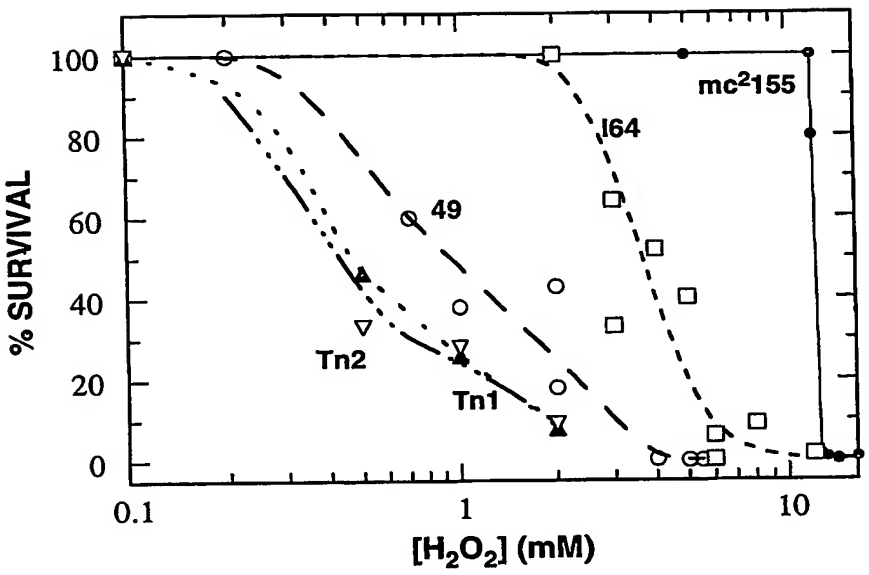



Figure 6

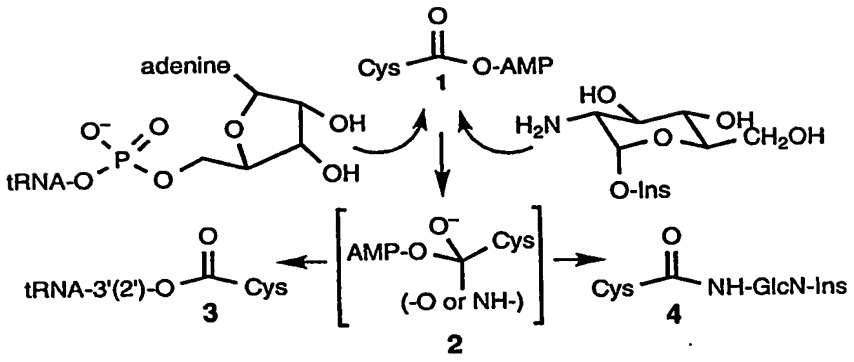

adenine
Cys
O-AMP
1
HO
OH
$H_2N$
O
$CH_2OH$
O-Ins
tRNA-O
P
O
OH
AMP-O
Cys
(-O or NH-)
2
tRNA-3'(2')-O
Cys
3
Cys
NH-GlcN-Ins
4

**Figure 7**

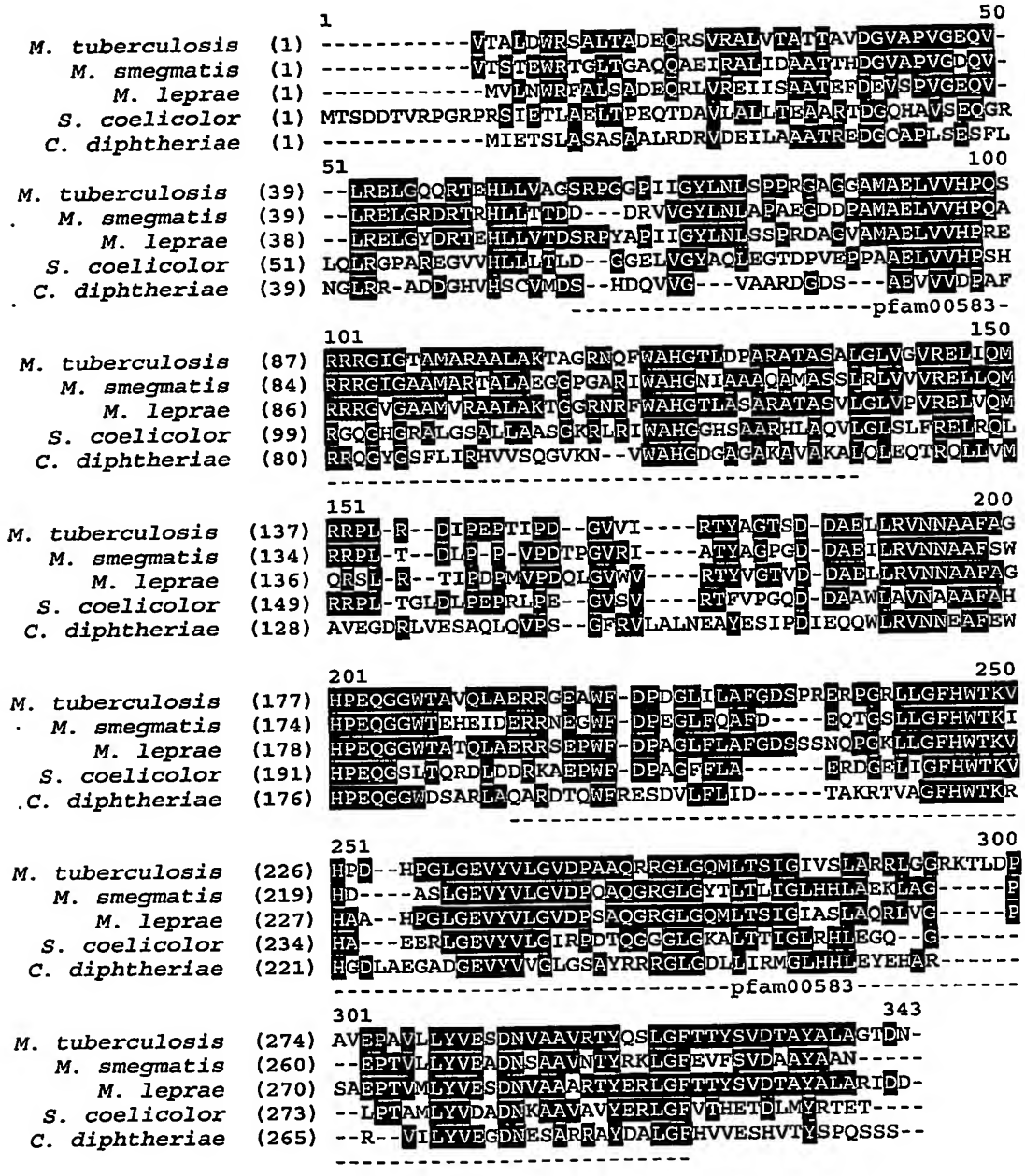

M. tuberculosis
M. smegmatis
M. leprae
S. coelicolor
C. diphtheriae
pfam00583

Figure 8

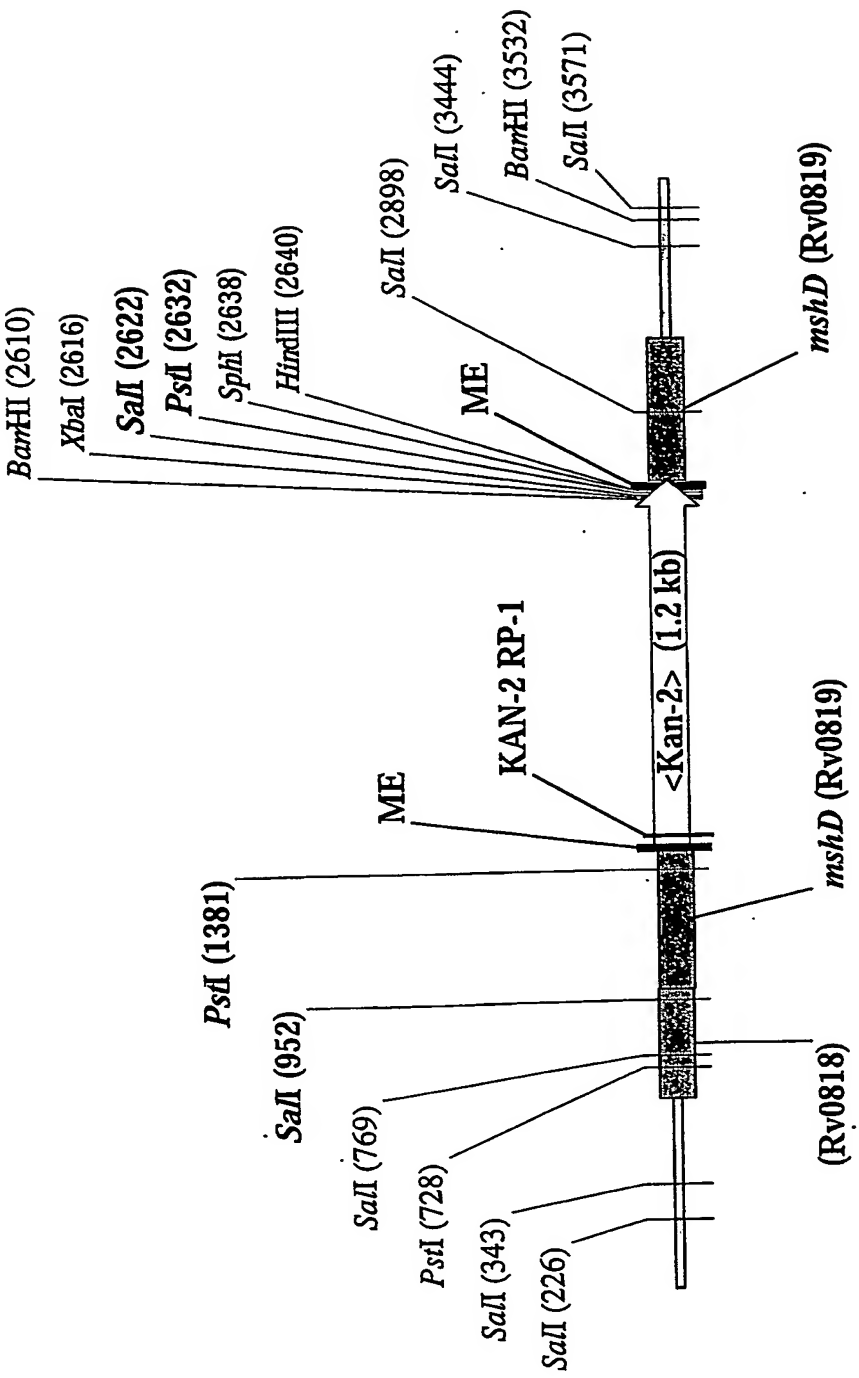

BamHI (2610)
XbaI (2616)
SalI (2622)
PstI (2632)
SphI (2638)
HindIII (2640)
SalI (2898)
ME
SalI (3444)
BamHI (3532)
SalI (3571)
mshD (Rv0819)
<Kan-2> (1.2 kb)
KAN-2 RP-1
ME
PstI (1381)
SalI (952)
SalI (769)
PstI (728)
SalI (343)
SalI (226)
mshD (Rv0819)
(Rv0818)

Figure 9

MshD amino acid sequence of *M. tuberculosis* (CAA17625.1) (Rv0819)

MTALDWRSALTADEQRSVRALVTATTAVDGVAPVGEQVLRELGQQRT
EHLLVAGSRPGGPIIGYLNLSPPRGAGGAMAELVVHPQSRRRGIGTAMA
RAALAKTAGRNQFWAHGTLDPARATASALGLVGVRELIQMRRPLRDIP
EPTIPDGVVIRTYAGTSDDAELLRVNNAAFAGHPEQGGWTAVQLAERR
GEAWFDPDGLILAFGDSPRERPGRLLGFHWTKVHPDHPGLGEVYVLGV
DPAAQRRGLGQMLTSIGIVSLARRLGGRKTLDPAVEPAVLLYVESDNVA
AVRTYQSLGFTTYSVDTAYALAGTDN (SEQ ID NO: 14)

**Figure 10A**

MshD amino acid sequence of *M. smegmatis* (PMshDMs-Tr)

VTSTEWRTGL TGAQQAEIRA LIDAATTHDG VAPVGDQVLR
ELGRDRTRHL LTTDDDRVVG YLNLAPAEGD DPAMAELVVH
PQARRRGIGA AMARTALAEG GPGARIWAHG NIAAAQAMAS
SLRLVVVREL LQMRRPLTDL PPVPDTPGVR IATYAGPGDD
AEILRVNNAA FSWHPEQGGW TEHEIDERRN EGWFDPEGLF
QAFDEQTGSL LGFHWTKIHD ASLGEVYVVG VDPQAQGRGL
GYTLTLIGLH HLAEKLAGPE PTVLLYVEAD NSAAVNTYRK
LGFEVFSVDA AYAAN (SEQ ID NO: 15)

**Figure 10B**

MshD amino acid sequence of *M. leprae* (ML2193)

MVLNWRFALSADEQRLVREIISAATEFDEVSPVGEQVLRELGYDRTEHL
LVTDSRPYAPIIGYLNLSSPRDAGVAMAELVVHPRERRRGVGAAMVRA
ALAKTGGRNRFWAHGTLASARATASVLGLVPVRELVQMQRSLRTIPDP
MVPDQLGVWVRTYVGTVDDAELLRVNNAAFAGHPEQGGWTATQLAE
RRSEPWFDPAGLFLAFGDSSSNQPGKLLGFHWTKVHAAHPGLGEVYVL
GVDPSAQGRGLGQMLTSIGIASLAQRLVGPSAEPTVMLYVESDNVAAA
RTYERLGFTTYSVDTAYALARIDD (SEQ ID NO: 16)

**Figure 10C**

MshD amino acid sequence of *Streptomyces coelicolor* (SCD84.18c, SCO4151)

MTSDDTVRPGRPRSIETLAELTPEQTDAVLALLTEAARTDGQHAVSEQG
RLQLRGPAREGVVHLLLTLDGGELVGYAQLEGTDPVEPPAAELVVHPS
HRGQGHGRALGSALLAASGKRLRIWAHGGHSAARHLAQVLGLSLFREL
RQLRRPLTGLDLPEPRLPEGVSVRTFVPGQDDAAWLAVNAAAFAHHPE
QGSLTQRDLDDRKAEPWFDPAGFFLAERDGELIGFHWTKVHAEERLGE
VYVLGIRPDTQGGGLGKALTTIGLRHLEGQGLPTAMLYVDADNKAAVA
VYERLGFVTHETDLMYRTET (SEQ ID NO: 17)

**Figure 10D**

MshD amino acid sequence of *Corynebacterium diphtheriae* (PMshDCd-Tr)

MIETSLASAS AALRDRVDEI LAAATREDGC APLSESFLNG
LRRADDGHVH SCVMDSHDQV VGVAARDGDS AEVVVDPAFR
RQGYGSFLIR HVVSQGVKNV WAHGDGAGAK AVAKALQLEQ
TRQLLVMAVE GDRLVESAQL QVPSGFRVLA LNEAYESIPD
IEQQWLRVNN EAFEWHPEQG GWDSARLAQA RDTQWFRESD
VLFLIDTAKR TVAGFHWTKR HGDLAEGADG EVYVVGLGSA
YRRRGLGDLL IRMGLHHLEY EHARRVILYV EGDNESARRA
YDALGFHVVE SHVTYSPQSS S (SEQ ID NO: 18)

**Figure 10E**

Nucleic acid sequence *mshD M. smegmatis*, including stop codon

GTGACCTCCACCGAGTGGCGCACCGGGCTCACGGGTGCCCAGCAGG
CAGAGATTCGCGCGCTGATCGACGCGGCCACCACGCACGACGGTGT
CGCGCCGGTCGGTGACCAAGTGCTGCGGGAACTGGGACGCGACCGC
ACCCGGCACCTGCTGACCACCGACGACGACCGCGTGGTCGGATACCT
CAACCTCGCGCCTGCCGAGGGGGACGATCCGGCGATGGCCGAACTC
GTCGTGCATCCGCAGGCCCGCCGGCGCGGTATCGGTGCGGCCATGGC
GCGCACCGCGCTGGCAGAGGGCGGGCCGGGCGCCCGTATCTGGGCG
CACGGCAACATCGCCGCCGCCCAGGCGATGGCGTCATCGCTTCGCCT
GGTGGTGGTGCGTGAGCTGCTGCAGATGCGCCGCCCCCTGACCGATC
TGCCGCCGGTGCCGGACACCCCCGGCGTGCGCATCGCGACCTACGCC
GGCCCCGGCGACGACGCCGAGATCCTGCGGGTCAACAACGCCGCGT
TCTCGTGGCACCCCGAGCAGGGCGTGA (SEQ ID NO: 48)

**Figure 10F**

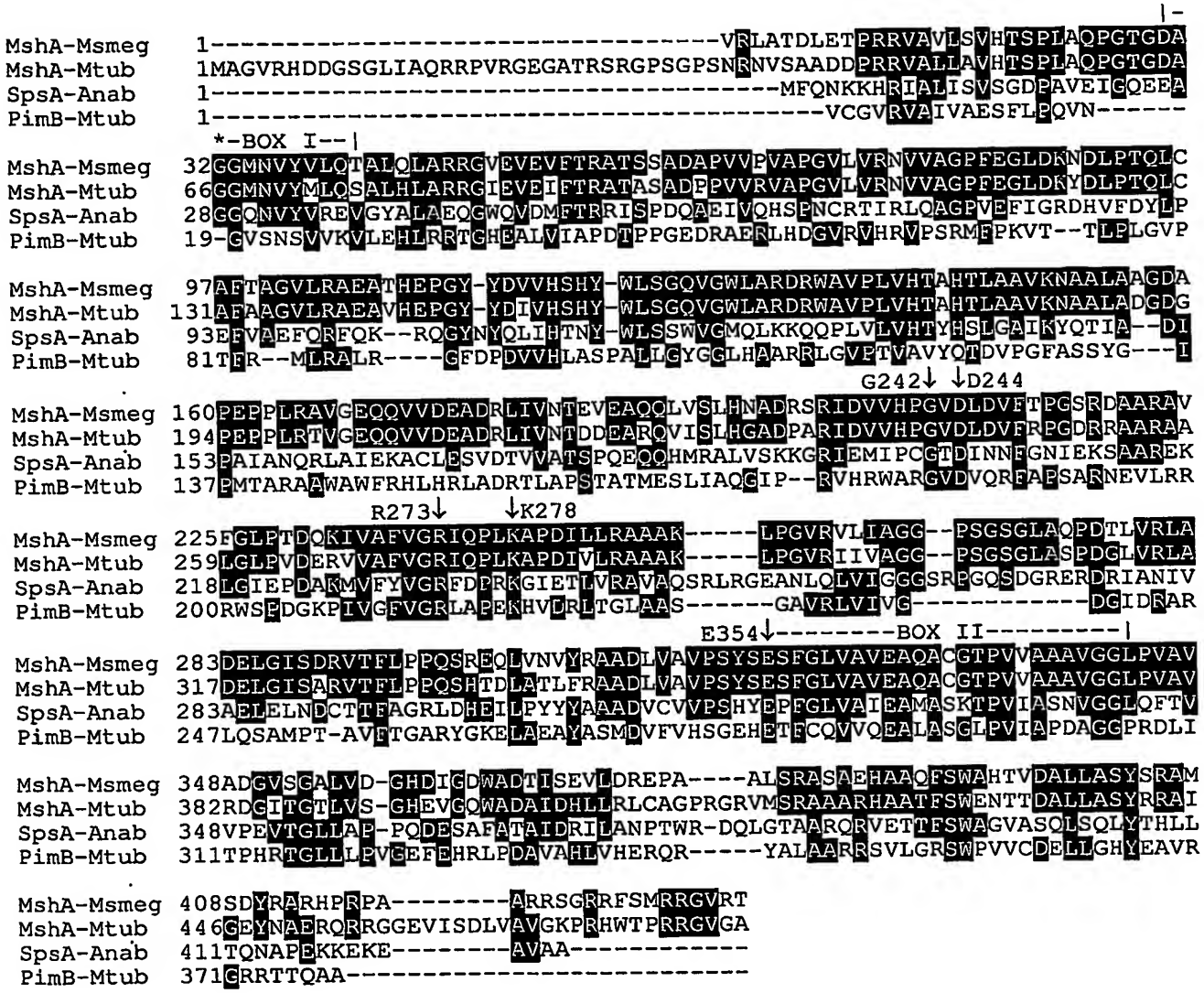

MshA-Msmeg
MshA-Mtub
SpsA-Anab
PimB-Mtub
*-BOX I--|
G242↓ ↓D244
R273↓ ↓K278
E354↓
BOX II

**Figure 11**

MshA amino acid sequence of *M. smegmatis* (PMshAMs-Tr)

VRLATDLETP RRVAVLSVHT SPLAQPGTGD AGGMNVYVLQ
TALQLARRGV EVEVFTRATS SADAPVVPVA PGVLVRNVVA
GPFEGLDKND LPTQLCAFTA GVLRAEATHE PGYYDVVHSH
YWLSGQVGWL ARDRWAVPLV HTAHTLAAVK NAALAAGDAP
EPPLRAVGEQ QVVDEADRLI VNTEVEAQQL VSLHNADRSR
IDVVHPGVDL DVFTPGSRDA ARAVFGLPTD QKIVAFVGRI
QPLKAPDILL RAAAKLPGVR VLIAGGPSGS GLAQPDTLVR
LADELGISDR VTFLPPQSRE QLVNVYRAAD LVAVPSYSES
FGLVAVEAQA CGTPVVAAAV GGLPVAVADG VSGALVDGHD
IGDWADTISE VLDREPAALS RASAEHAAQF SWAHTVDALL
ASYSRAMSDY RARHPRPAAR RSGRRFSMRR GVRT (SEQ ID NO: 19)

**Figure 12A**

MshA amino acid sequence of *M. tuberculosis* (PMshAMtG1002)

MAGVRHDDGS GLIAQRRPVR GEGATRSRGP SGPSNRNVSA ADDPRRVALL AVHTSPLAQP GTGDAGGMNV YMLQSALHLA RRGIEVEIFT RATASADPPV VRVAPGVLVR NVVAGPFEGL DKYDLPTQLC AFAAGVLRAE AVHEPGYYDI VHSHYWLSGQ VGWLARDRWA VPLVHTAHTL AAVKNAALAD GDGPEPPLRT VGEQQVVDEA DRLIVNTDDE ARQVISLHGA DPARIDVVHP GVDLDVFRPG DRRAARAALG LPVDERVVAF VGRIQPLKAP DIVLRAAAKL PGVRIIVAGG PSGSGLASPD GLVRLADELG ISARVTFLPP QSHTDLATLF RAADLVAVPS YSESFGLVAV EAQACGTPVV AAAVGGLPVA VRDGITGTLV SGHEVGQWAD AIDHLLRLCA GPRGRVMSRA AARHAATFSW ENTTDALLAS YRRAIGEYNA ERQRRGGEVI SDLVAVGKPR HWTPRRGVGA (SEQ ID NO: 20)

**Figure 12B**

Nucleic acid sequence *mshA M. smegmatis*, including stop codon

GTGCGTCTAGCGACAGACCT
CGAGACCCCCCGCCGCGTGGCGGTGTTGTCGGTACACACCTCTCCGC
TGGCGCAGCCGGGCACCGGCGACGCGGGCGGCATGAACGTCTACGT
GTTGCAGACCGCGCTGCAACTGGCCCGGCGTGGCGTCGAGGTCGAG
GTCTTCACCAGGGCCACGTCGTCGGCCGATGCGCCGGTCGTGCCTGT
GGCGCCCGGTGTGCTGGTGCGCAACGTCGTGGCCGGCCCGTTCGAAG
GCCTCGACAAGAACGATCTGCCCACGCAGCTGTGCGCGTTCACCGCG
GGTGTGCTGCGCGCCGAGGCGACCCACGAGCCCGGCTACTACGACG
TCGTGCATTCGCACTACTGGCTGTCCGGCCAGGTCGGGTGGCTGGCG
CGCGACCGCTGGGCCGTGCCGCTGGTGCACACCGCGCACACGCTGG
CCGCGGTCAAGAACGCCGCACTCGCCGCGGGCGACGCACCCGAGCC
GCCGCTGCGCGCGGTGGGCGAACAACAGGTGGTCGACGAGGCCGAC
CGCCTCATCGTGAACACCGAAGTCGAAGCGCAGCAACTGGTCTCGTT
GCACAATGCCGACCGCTCACGCATCGACGTCGTGCACCCCGGCGTCG
ATCTCGACGTGTTCACCCCCGGTTCGCGCGACGCGGCGCGCGCGGTG
TTCGGGCTTCCCACCGACCAGAAGATCGTGGCGTTCGTGGGCCGCAT
CCAGCCGCTCAAGGCCCCCGACATCCTGCTGCGTGCCGCGGCGAAAC
TGCCCGGCGTGCGCGTGCTGATCGCCGGTGGACCCTCCGGATCGGGA
CTTGCCCAACCGGACACGCTGGTTCGGCTCGCCGACGAACTGGGTAT
CAGTGACCGGGTGACGTTCCTCCCGCCGCAGAGCCGCGAACAACTG
GTCAACGTGTACCGGGCGGCCGATCTGGTCGCGGTGCCGAGCTACTC
CGAGTCGTTCGGCCTGGTCGCCGTCGAGGCGCAGGCGTGCGGCACGC
CCGTCGTCGCCGCGGCCGTCGGCGGACTGCCGGTCGCGGTGGCCGAC
GGCGTCAGCGGGGCACTCGTCGACGGCCACGACATCGGCGACTGGG
CCGACACCATCAGCGAGGTGCTCGACCGCGAGCCCGCCGCGCTGAG
CCGCGCCTCCGCCGAACACGCCGCTCAGTTCTCGTGGGCGCACACCG
TCGACGCGCTGCTCGCCAGCTACAGCCGGGCCAT
GAGTGACTACCGGGCCCGTCATCCCAGACCCGCCGCGCGGCGTTCCG
GACGCCGGTTCTCGATGCGCAGGGGAGTACGCACGTGA (SEQ ID NO: 49)

**Figure 12C**

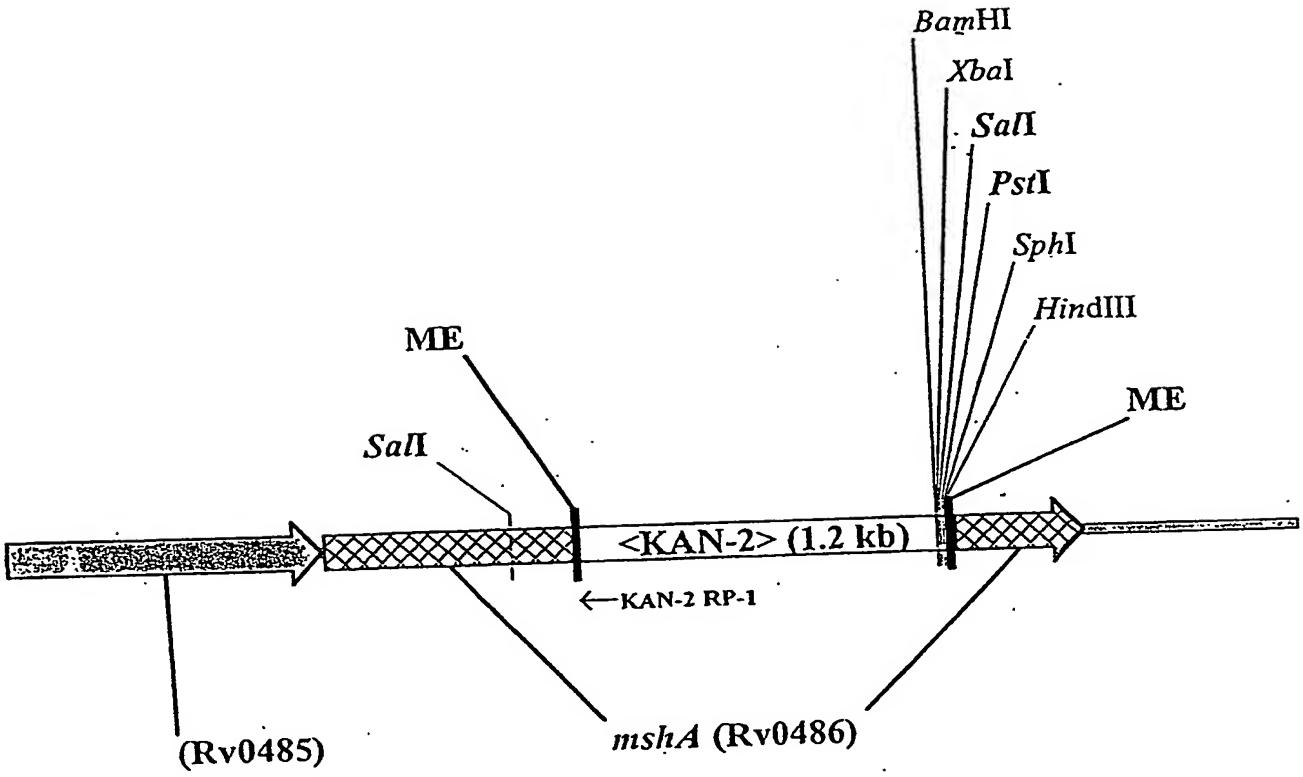

BamHI
XbaI
SalI
PstI
SphI
HindIII
ME
ME
SalI
<KAN-2> (1.2 kb)
←KAN-2 RP-1
(Rv0485)
mshA (Rv0486)

**Figure 13**

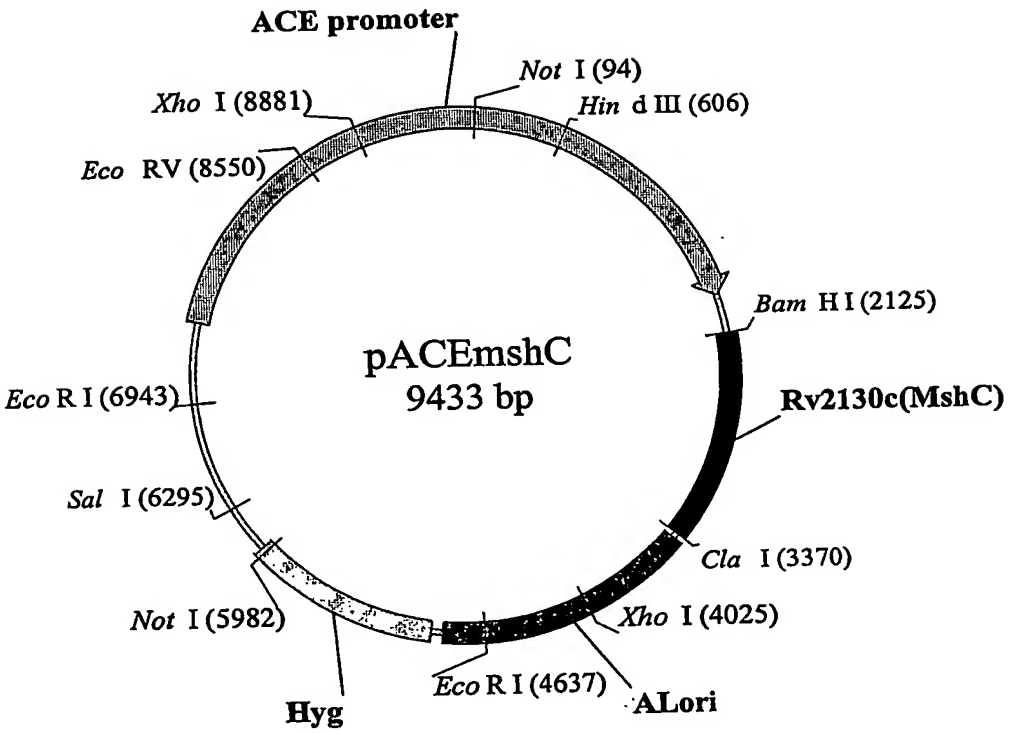
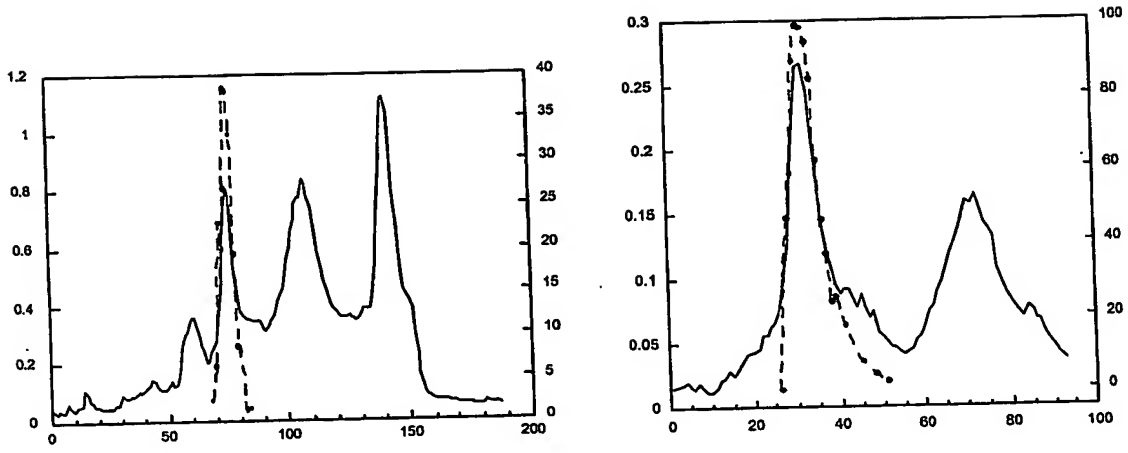

ACE promoter
Not I (94)
Hin d III (606)
Xho I (8881)
Eco RV (8550)
Bam H I (2125)
pACEmshC
9433 bp
Rv2130c(MshC)
Eco R I (6943)
Sal I (6295)
Cla I (3370)
Xho I (4025)
Not I (5982)
Eco R I (4637)
ALori
Hyg

**Figure 14**




(A) DEAE-M profile

(B) Hydroxyapatite profile

**Figure 15**

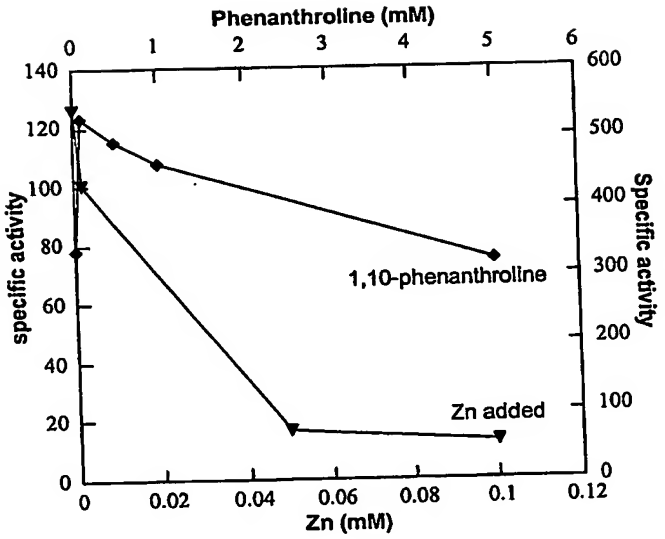

Phenanthroline (mM)
0
1
2
3
4
5
6
140
120
100
80
60
40
20
0
600
500
400
300
200
100
0
specific activity
Specific activity
1,10-phenanthroline
Zn added
0
0.02
0.04
0.06
0.08
0.1
0.12
Zn (mM)

**Figure 16**

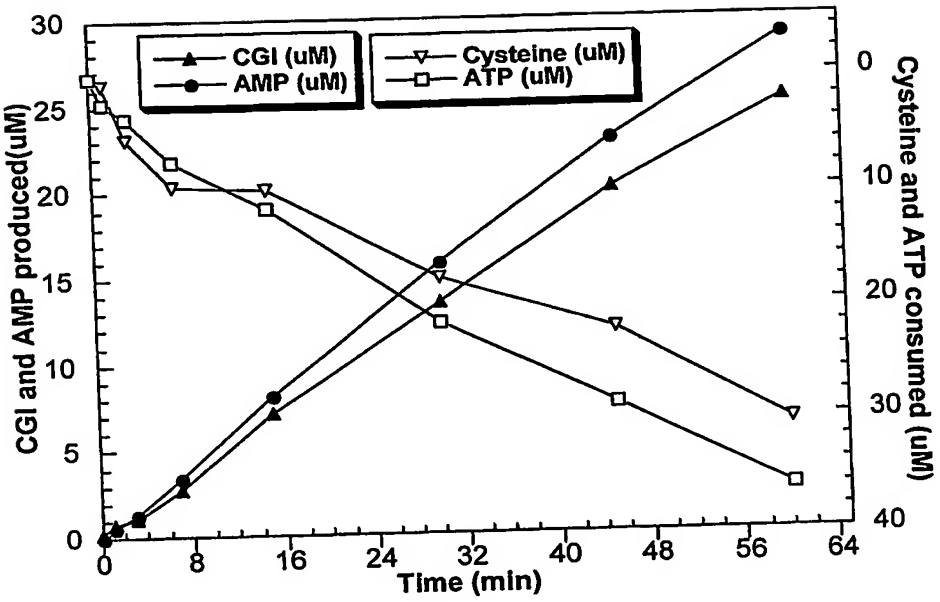

CGI (uM)
AMP (uM)
Cysteine (uM)
ATP (uM)
CGI and AMP produced(uM)
Cysteine and ATP consumed (uM)
Time (min)
0
5
10
15
20
25
30
0
10
20
30
40
0
8
16
24
32
40
48
56
64

**Figure 17**

**(a) First Half of Rossman fold:**

*M.smeg* MshC (40)--MYV**C**GITPYDAT**HLGH**AATYLTFDL(64)
*M.lepr* Mshc (11)ATMYV**C**GITPYDAT**HLGH**AATYLAFDL(37)
*S.coel*.MshC (40)--IYV**C**GITPYDAT**HMGH**AATYNAFDL(64)
*C.strt*.MshC (44)--MYV**C**GITPYDST**HLGH**AATYLTFDL(68)
*T.bifd*.MshC (40)--MYV**C**GITPYDAA**HLGH**AFTYLTFDL(64)
*M.tubr* CysS (30)--IYL**C**GATVQGLP**HIGH**VRSGVAFDI(54)
*E.coli* CysS (25)--MYV**C**GITVYDLC**HIGH**GRTFVAFDV(49)

**(b) Second half of Rossman Fold:**

*M.smeg* MshC (218)SPFGRGRPGW**H**VE**C**SAIALTRIGTGLDI***Q***GGGSDLIFP**HH**EY***S***AAHAESVT
*M.lepr* MshC (190)SPFGPGRPGW**H**VE**C**AAIALSRIGIGLDI***Q***GGGSDLIFP**HH**EF***T***AAHAECVR
*S.coel*.MshC (215)GTLGRGRPGW**H**IE**C**VAIALDHLGMGFDV***Q***GGGSDLAFP**HH**EM***G***ASHAQALT
*C.strt*.MshC (219)SPFGPGRPGW**H**VE**C**SAIATNRLGSHFAI***Q***GGGSDLAFP**HH**EF***S***AAHAEAAL
*T.bifd*.MshC (198)TPLGRGRPGW**H**VE**C**SAISVHELGMGFDL***N***GGGDDLIFP**HH**EM***G***AAEACCAT
*M.tubr* CysS (214)TPWGRGRPGW**H**LE**C**SAMARSYLGPEFDI***H***CGGMDLVFP**HH**EN***E***IAQSRAAG
*E.coli* CysS (196)SPWGAGRPGW**H**IE**C**SAMNCKQLGNHFDI***H***GGGSDLMFP**HH**EN***E***IAQSTCAH

*M.smeg* MshC GERRFARHYV**H**TGMIGWDGH**KMSKS**(293)
*M.lepr* Mshc GERRFARHYV**H**AGMIGWDEH**KMSKS**(265)
*S.coel*.MshC GEFPMAKAYV**H**AGMVGLDGE**KMSKS**(290)
*C.strt*.MshC KVERMAGHYV**H**AGMIALDGV**KMSKS**(294)
*T.bifd*.MshC GSRPQARHYL**H**VAMVGLDGE**KMSKS**(289)
*M.tubr* CysS DG--FARYWL**H**NGWVTMGGE**KMSKS**(271)
*E.coli* CysS DGQ-YVNYWM**H**SGMVMVDRE**KMSKS**(270)

**Figure 18**